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CHRISTOPHER DEVRIES
General Motors Corporation
Legal Staff, Mail Code 482-C23-B21
P.O. Box 300
Detroit, MI 48265-3000

EXAMINER	
SCHEUERMANN, DAVID W	

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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

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GROUP 2800

Application Number: 09/973,685
Filing Date: October 09, 2001
Appellant(s): STANCU ET AL.

Christopher DeVries
For Appellant

SUPPLEMENTAL EXAMINER'S ANSWER

This is in response to the supplemental appeal brief filed 6/25/2007.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

5,936,378	Iijima et al.	10 -1999
5,920,161	Obara et al.	7-1999
5,864,192	Negate et al.	1-1999

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-4, 6, 8-12 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iijima et al., US 5936378 in view of Nagate et al., US 5864192. Iijima et al., US 5936378 discloses:

An electric motor control system comprising:

a stator (1U, 1V, and 1W; see figure 1) for producing a magnetic field;

a surface mount permanent magnet rotor rotated by said magnetic field;

a motor shaft (inherent) coupled to said rotor;

power electronics for controlling said magnetic field in said stator;

wherein said power electronics controls the q-axis and d-axis current components for the electric motor (control box 50 in figure 1); and

a controller controlling said power electronics (Gain Production Unit 40, figure 1), said controller including a control block to control the d-axis current as a function of the angle β.

In block 114, of figure 18 of Iijima et al. show that I_d is a function of the variable Gai. In column 16, lines 42 - 55, Gai is clearly defined as a function of the angle β, as

set forth on line 55. Since I_d is a function of Gai and Gai is a function of angle β it follows that I_d is also a function of angle β.

Iijima et al., US 5936378 does not expressly disclose the limitation "... to control the d-axis current as a function of the angle β when said permanent magnet rotor is in magnetic saturation". Nagate et al., US 5864192 discloses using rare earth magnets in the rotor to cause magnetic saturation thereof, for the purpose of improving motor reliablility, note column 16, lines 38-44. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to use the rare earth magnets of Nagate et al., US 5864192, in the rotor of Iijima et al., US 5936378, along with the mating magnetic sensor. One of ordinary skill in the art would have been motivated to do this to improve motor reliability and facilitate assembly by increasing the axial distance between the magnetic sensor and the rotor end face.

As to claim 4, note the inverter within control block 10 of figure 1 of Iijima et al., US 5936378.

As to claim 14, note that total torque exhibits a non-linear behavior as shown in figure 21 by the arcuate relationship between the total torque and the angle β when the d-axis current is controlled as a function of angle β.

Re claim 6, see block 118 of figure 18 of Iijima et al., US 5936378.

Re claim 10, β is shown as the angle between the stator current vector with reference to the q-axis in figure 20. Also see figure 21, which inherently teaches the relationship between angle β and torque.

As to claim 11 and 12, note that the magnetic sensor, which mates with the rare earth magnets, would inherently operate to determine the position of the rotor while current sensor 2U determines the actual current of the electric motor.

(10) Response to Argument

Applicant's argument that, "Iijima et al. does not teach or suggest controlling the d and/or q axis current components as a function of the angle β," is refuted by the evidence shown below. In block 114 of figure 18 of Iijima et al. it is shown that I_d is a function of the variable Gai. In column 16, lines 42-55, Gai is clearly defined as a function of the angle β, note particularly the part about Kgaia at line 55. Since I_d is a function of Gai and Gai is a function of angle β it follows that I_d is a function of angle β. Therefore Iijima et al. do teach or suggest controlling the d and/or q axis current components as a function of angle β.

In similar fashion, I_q is controlled as a function of angle β, indirectly as shown in block 118 in figure 18 of Iijima et al. Iijima et al. use the Pythagorean Theorem to calculate I_q during dynamic operation when I_d is less than I_{in}.

Furthermore, in column 5, lines 8-14, Obara et al. teach, "...advanced angle δ or phase difference angle β at that time can be uniquely determined...," (emphasis added), when a target output, speed, and terminal voltage is selected. Note that the vector diagram of figure 3 clearly points out the relation between the power factor angle Ø, phase angle β, and advanced angle δ. By adjusting phase angle β, with a constant

power factor angle Ø, advanced angle δ is inherently adjusted. Furthermore the component relation between angle β, I_d, and I_q is also shown.

Finally, note that figure 9, shows that I_d, and I_q are generated by look-up tables. These look-up tables provide, "... the advanced angle δ and the phase difference angle β...," to enable maximum efficient operation (see Obara et al., column 5, lines 20-27). Thus, Obara et al. specifically teaches using angle β in look- up tables to generate i_q (q-axis current) and I_d (d-axis current) for both the purpose of maximizing efficiency and compensating for magnet temperature.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

David Scheuermann
July 16, 2007

Conferees:

Darren Schuberg

Andrew Hirshfeld AHH

CHRISTOPHER DEVRIES
General Motors Corporation
Legal Staff, Mail Code 482-C23-B21
P.O. Box 300
Detroit, MI 48265-3000